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Title: Synthesis and magnetic properties of iron nitrides

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Iron nitrides remain relatively unexplored materials, possibly due to the challenge of synthesizing them in phase-pure form. However, both theoretical predictions and limited experimental results show these materials could have interesting, and useful, magnetic properties. We have developed several methods to synthesize iron nitrides, including nitridation of nanoscale iron and electrochemical nitridation of iron foil. Notably, these methods enable the formation of several phases of iron nitride, including FeN , Fe_2N , Fe_3N , Fe_4N , and $\text{Fe}_{24}\text{N}_{10}$. The magnetic properties of these iron nitrides, as well as the synthetic details, will be discussed.

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